CLAIMS

1. A quadrature mixer arrangement for converting a first signal at a first frequency to a second signal at a second frequency, comprising:

a first mixer (200) operatively connected to a first and a second terminal; and

a second mixer (300) connected in parallel with the first mixer and operatively connected to the first, and second terminals;

characterized by

a set of switch devices (250, 260, 270, 280, 350, 360, 370, 380) provided in the signal path(s) between the mixers and the first and second terminals.

2. The arrangement according to claim 1, wherein

the first mixer (200) is arranged to be conductive for a first and/or a second state of a first mixing signal, and arranged to mix the first signal with the first mixing signal to provide the second signal;

the second mixer (300) is arranged to be conductive for a first and/or a second state of a second mixing signal, and arranged to mix the first signal with the second mixing signal to provide the second signal; and

switch devices (250, 260, 270, 280) connected to the first mixer arranged to be conductive for the first and/or second state of the second mixing signal, and switch devices (350, 360, 370, 380) connected to the second mixer arranged to be conductive for the first and/or the second state of the first mixing signal.

3. The arrangement according to claim 1 or 2, wherein the first and second mixing signals are first and second local oscillator (LO) signals (LO_I, LO_Q), and/or their inverse signals, having a common frequency and phases,

which are phase shifted Л/2 radians in relation to each other.

4. The arrangement according any of the previous claims, wherein the first and second mixer (200, 300) comprises a set of mixing means (210, 220, 230, 240, 310, 320, 330, 340), each of said mixing means having a first, second, and third terminal, the first mixer (200) is adapted to be driven by the first mixing signal being an LO signal and/or its inverse signal having first and third phases received at the third terminals of the mixing means (210-240) of the first mixer (200), and the second mixer is adapted to be driven by the second mixing signal being a second LO signal and/or its inverse signal having second and fourth phases received at the third terminals of the mixing means (310-340) of the second mixer (300).

5. The arrangement according to claim 4, wherein in each of the mixers (200, 300) first terminals of a first and a third mixing means (210, 230, 310, 330) of said set of mixing means are operatively connected to the first terminal of the arrangement and second terminals of said first and third mixing means are connected to first terminals of a second and a fourth mixing means (220, 240, 320, 340) of said set of mixing means, second terminals of said second and fourth mixing means are operatively connected to the second terminal of the arrangement, and wherein IF terminals are provided at the second terminals of said first and third mixing means.

6. The arrangement according to claim 5, wherein the mixing means (210-240, 310-340) are provided by transistors, and wherein the first and fourth mixing means (210, 240) of the first mixer (200) are adapted to be driven by the first mixing signal, the second and third

mixing means (220, 230) of said first mixer are adapted to be driven by the inverse signal of the first mixing signal, and wherein the first and fourth mixing means (310, 340) of the second mixer (300) are adapted to be driven by the second mixing signal, the second and third mixing means (320, 330) of said second mixer are adapted to be driven by the inverse signal of the second mixing signal.

7. The arrangement according to any of the previous claims, wherein the set of switch devices (250-280, 350-380) is provided by transistors.

8. The arrangement according to claim 6 or 7, wherein in each mixer (200, 300) first and third switch devices (250, 270, 350, 370) are provided in the signal path between the first terminal of the first and third mixing means (210, 230, 310, 330) and the first terminal of the arrangement, and second and forth switch devices (260, 280, 360, 380) are provided between the second terminals of the second and fourth mixing means (220, 240, 320, 340) and the second terminal of the arrangement.

9. The arrangement according to claim 8, wherein the first and fourth switch devices (250, 280) connected to the first mixer (200) are adapted to be driven by the second mixing signal, the second and third switch devices (260, 270) connected to said first mixer are adapted to be driven by the inverse signal of the second mixing signal, the first and fourth switch devices (350, 380) connected to the second mixer (300) are adapted to be driven by the first mixing signal, and the second and third switch devices (360, 370) connected to said second mixer are adapted to be driven by the inverse signal of the first mixing signal.

10. The arrangement according to any of the previous claims, wherein the mixers (200, 300) and/or the set of switch devices (250-280, 350-380) comprise a voltage controlled switch.

11. The arrangement according to any of the previous claims, wherein the mixers (200, 300) and/or the set of switch devices (250-280, 350-380) comprise FET transistors.

12. The arrangement according to claim 11, wherein the FET transistors are provided in CMOS technology.

13. The arrangement according to any of the previous claims, wherein the arrangement is provided as a transmitter mixer, the first signal is a quadrature IF signal to be received as an input signal, and the second signal is an RF signal to be provided as an output signal.

14. The arrangement according to any of the claims 1 to 12, wherein the arrangement is provided as a receiver mixer, the first signal is an RF signal to be received as an input signal, and the second signal is a quadrature IF signal to be provided as an output signal.

15. A wireless communication device (1) having a communication interface for wirelessly communicating with a remote communication device, **characterized** by a mixing arrangement according to any of the claims 1-14.

16. The device according to claim 15, wherein the device is a portable radio communication equipment, a mobile radio terminal, a pager, a communicator, an electronic organizer, or a smartphone.

17. The device according to claim 15, wherein the device is a mobile telephone (1).

18. A method of mixing signals for converting a first signal at a first frequency to a second signal at a second frequency, comprising the steps of:

receiving the first signal;

mixing the first signal in a mixer arrangement comprising a first and a second mixer (200, 300) connected in parallel to provide the second signal, each mixer is connected to a first and a second terminal;

characterized by the step of:

controlling a set of switch devices (250, 260, 270, 280, 350, 360, 370, 380) provided in a signal path between the mixers and a first terminal to operatively connect either the first or the second mixer to the first and second terminals.

19. The method according to claim 18, further comprising the steps of

controlling the first mixer (110; 200) to be conductive for a first and/or a second state of a first mixing signal for mixing the first signal with the first mixing signal to provide the second signal;

controlling the second mixer (120; 300) to be conductive for a first and/or a second state of a second mixing signal for mixing the first signal with the second mixing signal to provide the second signal;

controlling switch devices (250, 260, 270, 280) connected to the first mixer to be conductive for the first and/or the second state of the second mixing signal, and controlling switch devices (350, 360, 370, 380) connected to the second mixer to be conductive for the first and/or the second state of the first mixing signal.

20. The method according to claim 18 or 19, wherein the first and second mixing signals are first and second local oscillator (LO) signals, and/or their inverse signals, having a common frequency and first and second phases, which are phase shifted Π/2 radians in relation to each other.

21. The method according to any of the claims 18 to 20, comprising the steps of providing a set of mixing means (210, 220, 230, 240, 310, 320, 330, 340) in each of the first and second mixer (200, 300), wherein each of said mixing means has a first, second, and third terminal, driving the first mixer (200) by using the first mixing signal being a first LO signal and/or its inverse signal having first and third phases received at the third terminals of the mixing means (210-240) of the first mixer (200), and driving the second mixer by using the second mixing signal being a LO signal and/or its inverse signal having second and fourth phases received at the third terminals of the mixing means (310-340) of the second mixer (300).

22. The method according to claim 21, further comprising the steps of for each of the mixers (200, 300) operatively connecting a first terminal of a first and a third mixing means (210, 230, 310, 330) of said set of mixing means to the first terminal of the arrangement and a second terminal of said first and third mixing means to first terminals of a second and a fourth mixing means (220, 240, 340, 340) of said set of mixing means, operatively connecting a second terminal of said second and fourth mixing means to the second terminal of the arrangement, providing the third and fourth terminals being IF terminals at the second terminals of said first and third mixing means.

23. The method according to claim 22, further comprising the steps of providing the mixing means (210-240, 310-340) as transistors, driving the first and fourth mixing means (210, 240) of the first mixer (200) by using the first mixing signal, driving the second and third mixing means (220, 230) of said first mixer by using the inverse signal of the first mixing signal, driving the first and fourth mixing means (310, 340) of the second mixer (300) by using the second mixing signal, and driving the second and third mixing means (320, 330) of said second mixer by using the inverse signal of the second mixing signal.

24. The method according to any of the claims 18-23, comprising the step of providing the switch devices (250-280, 350-380) by means of a transistor.

25. The method according to claim 23 or 24, comprising the steps of for each mixer (200, 300) providing the first and third switch devices (250, 270, 350, 370) in the signal path between the first terminal of the first and third mixing means (210, 230, 310, 330) and the first terminal, and second and forth switch devices (260, 280, 360, 380) between the second terminals of the second and fourth mixing means (220, 240, 320, 340) and the second terminal.

26. The method according to claim 25, comprising the steps of driving the first and fourth switch devices (250, 280) connected to the first mixer (200) by using the second mixing signal signal, driving the second and third switch devices (260, 270) connected to said first mixer by using the inverse signal of the second mixing signal signal, driving the first and fourth switch devices (350, 380)

connected to the second mixer (300) by using the first mixing signal signal, and driving the second and third switch devices (360, 370) connected to said second mixer by using the inverse signal of the first mixing signal.

27. The method according to any of the claims 18 to 26, comprising the step of providing the mixers (100; 200, 300) and/or the switch devices (140; 250-280, 350-380) as a voltage controlled switch.

28. The method according to any of the claims 18-27, comprising the step of providing the mixers (100; 200, 300) and/or the switch devices (140; 250-280, 350-380) by FET transistors.

29. The method according to claim 28, comprising the step of providing the FET transistors by using CMOS technology.

30. The arrangement according to any of the claims 18 to 29, comprising the step of providing the arrangement as a transmitter mixer, the first signal being a quadrature IF signal, and the second signal being an RF signal.

31. The arrangement according to any of the claims 18 to 29, comprising the step of providing the arrangement as a receiver mixer, the first signal being an RF signal, and the first signal being a quadrature IF signal.